

1 What is claimed is:

2
3 1. An apparatus for automating an atmospheric pressure
4 ionization source for a mass spectrometer, wherein said apparatus
5 comprises:

6 a source tray;

7 a robot;

8 at least one atmospheric pressure ionization (API)

9 source device;

10 a mass analyzer; and

11 a capillary having an inlet end and an outlet end;

12 wherein said inlet end of said capillary is positioned by
13 said robot for accepting ions from at least one of said API
14 source devices, and

15 wherein said outlet end of said capillary is positioned such
16 that said ions are introduced into said mass analyzer.
17

18 2. An apparatus according to claim 1, wherein said capillary
19 comprises a channel traversing substantially straight through
20 said capillary.

21
22 3. An apparatus according to claim 1, wherein said capillary
23 comprises a channel having a helical structure.
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1 4. An apparatus according to claim 1, wherein said capillary
2 comprises a channel having a sinusoidal structure.

3
4 5. An apparatus according to claim 1, wherein said inlet end
5 and said outlet end of said capillary comprise conductive end
6 caps.

7
8 6. An apparatus according to claim 1, wherein said outlet end
9 of said capillary is positioned such that said ions are
10 transported into a first vacuum region of apparatus.

11
12 7. An apparatus according to claim 1, wherein said API source
13 device is selected from the group consisting of electrospray
14 ionization (ESI) source, matrix-assisted laser desorption/
15 ionization (MALDI) source and chemical ionization (CI) source.

16
17 8. An apparatus according to claim 7, wherein said ESI source
18 is a pneumatically assisted electrosprayer.

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20 9. An apparatus according to claim 7, wherein said ESI device
21 is a microelectrosprayer.

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23 10. An apparatus according to claim 7, wherein said ESI device
24 is a nanoelectrosprayer.

1 11. An apparatus according to claim 1, wherein said apparatus
2 comprises at least one ESI source and at least one CI source.
3

4 12. An apparatus according to claim 1, wherein said mass
5 analyzer is selected from the group consisting of a time-of-
6 flight mass analyzer, a quadrupole mass analyzer, a quadrupole
7 ion trap mass analyzer, and a Fourier transform ion cyclotron
8 resonance mass analyzer.

9
10 13. An apparatus for automating an atmospheric pressure
11 ionization source for a mass spectrometer, wherein said apparatus
12 comprises:

13 a source tray;

14 a robot;

15 at least one atmospheric pressure ionization (API)

16 source device;

17 a mass analyzer; and

18 a capillary having an inlet end and an outlet end;

19 wherein said API source device is positioned by said robot
20 such that ions produced therefrom are introduced into said inlet
21 end of said capillary, and

22 wherein said outlet end of said capillary is positioned such
23 that said ions are introduced into said mass analyzer.
24
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1 14. An apparatus according to claim 13, wherein said capillary
2 comprises a channel traversing substantially straight through
3 said capillary.

4
5 15. An apparatus according to claim 13, wherein said capillary
6 comprises a channel having a helical structure.

7
8 16. An apparatus according to claim 13, wherein said capillary
9 comprises a channel having a sinusoidal structure.

10
11 17. An apparatus according to claim 13, wherein said inlet end
12 and said outlet end of said capillary comprise conductive end
13 caps.

14
15 18. An apparatus according to claim 13, wherein said outlet end
16 of said capillary is positioned such that said ions are
17 transported into a first vacuum region of apparatus.

18
19 19. An apparatus according to claim 13, wherein said API source
20 device is selected from the group consisting of electrospray
21 ionization (ESI) source, matrix-assisted laser desorption/
22 ionization (MALDI) source, and chemical ionization (CI) source.

23
24 20. An apparatus according to claim 19, wherein said ESI source
25 is a pneumatically assisted electrosprayer.

21. An apparatus according to claim 19, wherein said ESI device is a microelectrosprayer.

22. An apparatus according to claim 19, wherein said ESI device is a nanoelectrosprayer.

23. An apparatus according to claim 13, wherein said apparatus comprises at least one ESI source and at least one CI source.

24. An apparatus according to claim 13, wherein said mass analyzer is selected from the group consisting of a time-of-flight mass analyzer, a quadrupole mass analyzer, a quadrupole ion trap mass analyzer, and a Fourier transform ion cyclotron resonance mass analyzer.

1 25. An apparatus for automating an atmospheric pressure
2 ionization source for a mass spectrometer, wherein said apparatus
3 comprises:

- 4 a source tray;
5 a robot;
6 at least one atmospheric pressure ionization (API)
7 source device;
8 first and second capillary sections each having an
9 inlet end and an outlet end;
10 a union having first and second openings; and
11 a mass analyzer;

12 wherein said outlet end of said first capillary section is
13 removably positioned within said first opening of said union, and
14 wherein said inlet of said second capillary section is removably
15 positioned within said second opening of said union.
16

17 26. An apparatus according to claim 25, wherein said first
18 section comprises a channel having a helical structure.
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20 27. An apparatus according to claim 25, wherein said union
21 comprises means for removably securing said ends of said first
22 and second sections.
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1 28. An apparatus according to claim 25, wherein said union
2 comprises means for providing a substantially airtight seal
3 between said ends of said first and second sections within said
4 union.

5
6 29. An apparatus according to claim 25, wherein said inlet ends
7 and said outlet ends comprise conductive end caps.

8
9 30. An apparatus according to claim 25, wherein said ions are
10 transported from an ionization source into a first vacuum region
11 of a mass spectrometer.

12
13 31. An apparatus according to claim 25, wherein said API source
14 device is selected from the group consisting of electrospray
15 ionization (ESI) source, matrix-assisted laser desorption/
16 ionization (MALDI) source and chemical ionization (CI) source.

17
18 32. An apparatus according to claim 31, wherein said ESI source
19 is a pneumatically assisted electrosprayer.

20
21 33. An apparatus according to claim 31, wherein said ESI device
22 is a microelectrosprayer.

23
24 34. An apparatus according to claim 31, wherein said ESI device
25 is a nanoelectrosprayer.

1 35. An apparatus according to claim 25, wherein said apparatus
2 comprises at least one ESI source and at least one CI source.

3
4 36. An apparatus according to claim 25, wherein said mass
5 analyzer is selected from the group consisting of a time-of-
6 flight mass analyzer, a quadrupole mass analyzer, a quadrupole
7 ion trap mass analyzer, and a Fourier transform ion cyclotron
8 resonance mass analyzer.